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UNITED STATES DEPARTMENT OF AGRICULTURE
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BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

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TITLE

MISCELLANEOUS OUTBREAKS OF FOREST AND RELATED INSECTS IN THE NORTHERN ROCKY MOUNTAINS 1949 - 1951

Denton, R.E.

Forest Insect Laboratory
Coeur d'Alene, Idaho
April 1952

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September 25, 1952

To: J. A. Beal, In Charge, Forest Insect Investigations

From: James C. Evenden, P. O. Box 630, Coeur d'Alene, Idaho

Subject: Report on "Miscellaneous Outbreaks of Forest and Related Insects in the Northern Rocky Mountains, 1949-1951"

We are enclosing a copy of a short report by Mr. Denton listing some of the miscellaneous forest insect infestations that occurred during the 1951 season.

I am sorry that we are so late in submitting this report for it will soon be time to prepare one for the 1952 season.

We would appreciate your comments as to the value of such reports.

cc: H. J. MacAloney
H. D. Wygant
C. B. Eaton
L. W. Orr
J. W. Bongberg
R. L. Furniss

Nice Photos - JAB
Good piece of work - KHW

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH ADMINISTRATION
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
Division of Forest Insect Investigations

MISCELLANEOUS OUTBREAKS OF FOREST AND RELATED INSECTS

IN THE

NORTHERN ROCKY MOUNTAINS

1949 - 1951

Forest Insect Laboratory
Coeur d'Alene, Idaho
April 1952

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MISCELLANEOUS OUTBREAKS OF FOREST AND RELATED INSECTS

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1949 - 1951 1/

INTRODUCTION

Each year during the course of regular forest insect investigative work in this region, personnel of the laboratory often encounter concentrations of lesser important forest and related insects, or minor outbreaks of more important species. This was especially true during the 1951 season. In addition numerous insect detection survey reports were received from many cooperators and investigated during the year. 2/ Not all of the observations and detections required written reports or even further examination, if the outbreaks were known to be of little consequence or if the insects were known to be of minor economic importance.

In the majority of cases reported here, therefore, no detailed information was obtained concerning these observations. Nevertheless, during a recent staff meeting it was proposed that descriptions of the examinations be compiled as a matter of interest as well as record. In some instances the following accounts constitute the first written record concerning the insects in this region. For convenience the species reported upon have been grouped according to their systematic classification, rather than by importance of the insect or the extent of infestation.

1/ Compiled by Robert E. Denton, Entomologist

2/ A list of cooperators, detection survey reports, and action that was taken, may be found in the report "Forest Insect Conditions in the Northern Rocky Mountains - 1951", compiled by Philip C. Johnson, January 1952.

HOMOPTERA: APHIDAE

Alpine Fir Foliage Aphid (Undetermined). In July 1951 a reconnaissance was made of the headwaters of Norton Creek, on the eastern slope of the St. Joe National Forest Divide, Idaho to check what was reported to be an infestation of the spruce budworm. The examination showed that there was no spruce budworm in this area. Instead, it seemed that the condition responsible for the initial report was due to a "budworm infested appearance" of the new foliage of alpine fir, which, in reality, was quite heavily infested with a large, green plant aphid. Numerous branch tips were observed on which the needles were matted together and, upon parting the foliage, a cluster of aphids was disclosed. The matted condition was caused by copious and sticky honeydew produced by the feeding insects (Figure 1). Engelmann spruce, the other principal timber species, was not infested by this aphid.

The amount of damage to the trees resulting from this type of feeding was slight, judging by the full complement of foliage and the normal growth of new shoots. However, on several trees a small percentage of the 1950 needles appeared to have been killed by the heavy drain of sap and these withered, red needles were clustered at the base of the current year's growth. Unless one were familiar with the appearance of spruce budworm injury it is understandable how these dead needles could result in a mistaken identity of the insect responsible, especially if the observation was made in the fall, as in this case, when damaged needles were the only indication of insect activity.

Western White Pine Bark Aphid (Cinara sp. Curtis). In June 1949 an infestation of bark aphids on western white pine was recorded in Fairway Creek on the Kootenai National Forest, Montana (about 2 miles north of Spar Lake and 6 miles northwest of Bull Lake). Concentrations of this insect were noted also in the immediate vicinity of Spar Lake.

Examination of these areas disclosed heavy concentrations of a grayish bark aphid in a pole stand of white pine with trees ranging from 2 inches to 10 inches in diameter. In a few locations the insects were so numerous that smaller growth beneath the infested trees was covered with a glaze of honeydew that fell in a constant rain of fine droplets. They were generally feeding in groups averaging about 30 individuals, although as many as 400 or more were noted in other groups. In several colonies the insects were so crowded together that not infrequently aphids in the center were

clinging to the bark solely by their feeding stylets.

Attacks were confined to the relatively smooth, fleshy bark of smaller trees or the upper boles of larger trees. The infested areas of bark were usually small because of the compactness of the groups - the largest measured 2 inches by 6 inches. Apparently the aphids did not feed on any one area for an extended period of time, but moved about with considerable frequency.

Beneath the feeding mass a lighter gray, waxy secretion was formed on the bark that,in shaded places, persisted for a year or more as an identifiable gray powder. In exposed places this evidence disappeared in a few weeks.

Subsequent observations on several national forests (Kaniksu, Cabinet, Coeur d'Alene, St. Joe, and Clearwater) indicated that the aphid was specific to western white pine.

It was peculiar that within a month after the initial examination a drastic reduction in numbers occurred and, by August, only a few small colonies remained. By September there had been a still further reduction. In 1950 there was no evidence of a recurrence of the outbreak.

Evaluation of the causes of reduction was impossible with the limited observations that were made. However, several parasites and predators were numerous, and probably played an important role. In one instance a predator was observed in the midst of a colony, feeding upon various stages of aphids. Feeding aphids, even in contact with the predator, seemed unaware of the enemy devouring their neighbors. Occasionally, however, something seemed to disturb a colony and aphids would scatter in all directions away from the menace in their midst. Coccinellid and syrphid predators were most numerous. Hymenopterous parasites, both large and small were noted but, unfortunately, it was not possible to collect individuals for identification.

No external evidence of damage was observed when the examinations were made. The bark surface areas on which the colonies had fed were examined in 1949 and for 2 succeeding years without finding any indication of deterioration. Likewise, microscopic examination of the feeding areas on the bark surface and within the cambium failed to reveal any evidence of injury.

Areas of bark on which the aphids have fed have been marked on 2 plots established on Fairway Creek and on a number of plots selected for pole blight study. These areas will be inspected periodically for any delayed effect the feeding may have had.

Grand Fir Bark Aphid (Cinara sp. Curtis). Concurrent with the outbreak of the "western white pine bark aphid", described in the preceding section, another species of bark aphid appeared in somewhat smaller numbers on grand fir on the Coeur d'Alene National Forest, Idaho. This aphid was dark gray in color, and had the same general habits as the one on western white pine. It, too, was found in compact colonies on the boles of smaller trees. The occurrence of the insect was quite variable, some trees showing no evidence of feeding whereas neighboring trees were heavily infested. Presence of the aphids in quantity was revealed by a glaze of honeydew on the bark and foliage, but in no case was any visual damage apparent. As in the case of the aphid on western white pine bark, the outbreak dropped out of existence the following year.

In 1951 an isolated occurrence of what was presumed to be the same insect species was observed near Lewiston, Idaho (Figure 2). Large numbers ofaphids were clustered on twigs of grand fir reproduction, mainly on the undersides to escape the direct rays of the sun. Upon turning an infested branch over so that the undersurface was exposed to sunlight, the aphids immediately scattered and sought another shaded location. As in the foregoing examination, no evidence of damage to grand fir twigs was observed.

COLEOPTERA: SCOLYTIDAE

California Pine Engraver (Ips plastographus (Lec.)). On September 27, 1950, adult beetles of the California pine engraver were found tunneling under the bark and into the sapwood of recently windfelled lodgepole pine trees near the summit of Parsnip Mountain, Kootenai National Forest, Montana. At this location, approximate elevation 6,100 feet, a patch of dense pine some 50 acres in extent was almost completely uprooted by a violent windstorm on November 27, 1949. The windfalls averaged 10-14 inches d.b.h..

The beetles are ordinarily cambium miners and are not known to tunnel into the wood. The fact that they were doing so led to the belief that this was an effort to hibernate and that they chose to enter the wood in lieu of the scant protection offered by the 1/8-inch thick bark of the infested windfalls.

The tunnels in the wood penetrated to a depth of only 1/4 inch. They were round in cross-section, slightly larger across than the cross sectional diameter of the beetle, and most of them were C-shaped for their entire length of about 3/8 or 1/2 inch. (Figure 3). The edges of the tunnel entrances were smoothly rounded, having been shaped in that manner either by the beetles themselves or from

constant travel in and out of the tunnels.

During the October 1950 examination nearly every sapwood tunnel contained an adult beetle. Other adults were found in irregularly shaped wandering tunnels between the bark and the wood (Figure 4). The tunnels were not radiate or star-shaped such as those commonly associated with Ips attacks. Furthermore, they appeared to contain frass not too solidly packed. This indicated that the cambial tunnels might have been constructed for feeding purposes.

Unfortunately, one can only surmise the conditions leading to the above attacks. The windfelled lodgepole pine laid in place all through the 1950 summer season yet, as desirable a host as this material constitutes, the only attacks appeared to be those described above which presumably were made early in September. It is likely that the short summer season with its favorable temperatures had ended about the time the attacks were made and that the beetles immediately sought hibernation after attacking the windfalls. Mean minimum daily temperatures for September are close to freezing at Parsnip Mountain and early fall cold storms are not infrequent. The September 27, 1950 examination was made during a prolonged blizzard.

COLEOPTERA: CURCULIONIDAE

Engelmann Spruce Weevil (Pissodes engelmanni Hopk.). For several years the Engelmann spruce weevil has been prevalent on Engelmann spruce reproduction in the vicinity of Seeley Lake on the Flathead National Forest and along the Gallatin River northwest of Yellowstone National Park in Montana. In 1951 a similar report was received from the Kaniksu National Forest, Idaho.

Repeated attacks by this insect have resulted in stunted, bushy growth of trees over widespread areas on several sections around Seeley Lake (Figure 5). However, to date economic importance of the damage has been slight and no forest control measures have been attempted. In this connection, no evidence of the effectiveness of parasites in reducing the infestation has been observed, although in rearing a collection of weevils a few specimens of Rhopalicus pulchripennis (Crawfd.) (Hymenoptera: Pteromalidae) were recovered. In several instances where ornamental plantings have been attacked localized control has been achieved by cutting and destroying infested leaders.

It is conceivable that outbreaks of this insect in this region will become increasingly important in the future, under more intensive management of Engelmann spruce forests.

Willow Weevil (Cryptorhynchus lapathi (L.)). The presence of the willow weevil in the northern Rockies was established in 1931 from a collection by James C. Evenden at Priest River, on the Kaniksu National Forest, Idaho (Figure 6). How widespread the insect is in this region is not fully known, but it has been noted on the St. Joe and Coeur d'Alene National Forests, Idaho, and on the Cabinet National Forest, Montana, in addition to the one mentioned above.

In 1951 heavy damage to willow by this insect was observed on the Santa Creek drainage of the St. Maries River (St. Joe National Forest). Most of the larger diameter willow stems were dead, although the sprouting ability of this species has prevented its elimination from the landscape. Even so, living stubs from which sprouts develop are likely to be infested and gradually killed back, as are any stems more than a few years old.

The economic importance of the willow weevil to forestry practice in this region is slight. The greatest amount of concern over the insect has been registered by property owners in Coeur d'Alene, Idaho, and vicinity, upon discovery that ornamental plantings of willow and cottonwood have become infested. In a recent case, advice was sought concerning the dying of a brushy growth of cottonwood sprouts that served to screen a summer home at Spirit Lake, Idaho. Upon cutting into the basal growth from which the sprouts originated, larvae of the willow weevil were found mining in the cambial tissues of the root-crown. In such cases, no satisfactory control measures have been determined in this region.

COLEOPTERA: SCARABAEIDAE

Ten-lined June Beetle (Polyphylla decemlineata (Say.)). During July of 1949, 1950, and 1951, adults of the ten-lined June beetle have been observed feeding upon the needles of ponderosa pine at Spokane, Washington. The feeding appeared to be concentrated on pine reproduction and saplings in the northern section of the city and between that point and the town of Mead, several miles to the northeast. Most of this area is regarded as a marginal pine growing site and, during the period of observations, most of the trees suffered severe needle "burning" from atmospheric industrial fluorides.

In areas where the beetle population was concentrated, about 50 per cent of the needle clusters at the ends of the lateral branches were badly damaged. From 50 to 75 per cent of the needles in these infested clusters were devoured, usually by a single adult beetle. Individual needles were fed upon progressively from the outer end toward the base, leaving only the thin angular mid-rib intact. This soon turned a straw color and shrank into tightly-curled grotesque shapes (Figure 7).

Following two or three years of adult feeding in some parts of the generally infested area, damage to the trees has not appeared serious, probably resulting only in loss of lineal increment of the infested twigs. It is conceivable that exceedingly large adult populations concentrated on relatively few trees or small areas could result in serious tree defoliation.

Not much is known of the habits of Polyphylla although it is generally distributed throughout the eastern and western parts of the United States. The above described observations may be one of the first records of adult feeding on ponderosa pine.

LEPIDOPTERA: LASIOCAMPIDAE

Forest Tent Caterpillar (Malacosoma disstria Hbn.). In July 1951 a detection survey report concerning an outbreak of the forest tent caterpillar on larch, white fir, and spruce was received from the Colville National Forest, Washington. Although this insect is not uncommon in the northern Rocky Mountains, considerable interest was aroused since heretofore it has never been reported infesting coniferous tree species in this region. Because of this Messrs. Evenden and Denton of the laboratory staff visited the area to observe this phenomenon and the extent of damage.

The infestation covered 5 acres or more, approximately 10 miles up Deadman Creek from U. S. Highway 395 (T37N. R36E; Williamette Principal Meridian). Initially it had been concentrated in dense clumps of alder that bordered the creek, but after completely defoliating this host a mass migration followed in search of additional food and the caterpillars climbed any species of tree and shrub encountered. Thus, the reported infestation of outlying timber was occasioned by forced pupation of the insects on non-host tree species, comprising a scattered, pole-size stand characterized by tall (130 feet) western larch with white fir occupying an intermediate position. The understory included both larch and fir, intermingled with Engelmann spruce and western red cedar.

Typical appearance of the infested foliage is shown in Figure 8. Untold numbers of these cocoons were clustered upon the branches of larch and fir, even at the extreme tips of the tallest trees. The majority of insects had already pupated, and bands of egg masses were conspicuous upon the bare portions of twigs of alder and, surprisingly enough, upon larch and cedar also.

Negligible damage has occurred in the area to date. The infested trees had already begun to produce a second crop of foliage during

the current season. Only one tree species, western larch, had sustained any defoliation and it, too, produced a second, although much stunted, crop of foliage. Apparently Engelmann spruce, white fir, and western red cedar were unpalatible to the caterpillars since no evidence of feeding upon these species was observed.

The fact that most broadleaved hosts of the forest tent caterpillar have the ability to produce a second crop of foliage during a season gives a singular peculiarity to the fact that, in this instance, the only coniferous species fed upon has the same ability.

The severity of the infestation should show a marked decrease in the coming season owing, mainly, to starvation and parasitism. In an attempt to rear a collection of pupae through to the adult stage, approximately 50 per cent were found to be parasitized.

LEPIDOPTERA: PIERIDAE

Pine Butterfly (Neophasia menapia Feld.). The pine butterfly was found in increasing numbers in western white pine forests of the Clearwater River drainage, Idaho, in 1951. This is based upon a comparison of the number of butterflies observed in flight in 1951 with that of recent years. In 1951, an average of 10 to 14 butterflies per tree crown were observed in contrast to an average of 3 to 5 butterflies per crown during the past two to three years. Despite this apparent increase in population, no evident tree damage was observed in 1951. Because of the well-known destructive nature of butterfly epidemics, the 1951 observation warrants a further population check in 1952.

LEPIDOPTERA: AEGERIIDAE

Sequoia Pitch Moth (Vespamima sequoiae (Hy. Edw.)). A small infestation of the sequoia pitch moth in young lodgepole pine trees has persisted for the past several years near the west entrance of Glacier National Park, Montana. The infestation was first reported to laboratory personnel during a forest insect survey of the park in 1948. It has been subsequently observed during the surveys of 1949, 1950, and 1951. During this time the infestation remained more or less static in an area of a few hundred acres of 20-year old pine which became established soon after the 1929 Apgar fire (Figure 11).

Infested trees appear to bear no outward sign of damage even though suffering successive attacks by the moth at the root crown (Figure 9). Some individual trees show evidence of having been attacked each year since 1945 or 1949, while nearby trees remained unattacked.

Currently infested trees contain 1 or 2 attacks. A single larva develops in each attack amid a mass of soft, granular pitch emanating from the cambial wound caused by its feeding activities. The pitchy mass accumulating on the bole bark surface immediately above the ground is irregular in shape, from 1 to 2 inches in diameter and sometimes almost as thick. Though the mass is semi-solid and whitish in color, it is perforated by a tubular opening extending into the cambium. The opening averages about 1/4 to 3/8 inch in diameter, slightly larger than the diameter of the larva, and is filled in part with clear liquid resin in which the larva seemingly floats at times. Pitch masses from attacks of previous years are more or less hardened throughout and yellowish.

Examinations of the infestation have been made between July and September and the only brood stages found have been larvae, either half or full-grown. It is believed that a two year life cycle prevails here as it does elsewhere in the western part of the United States. Adult moths presumably deposit eggs on the bark surface in June or July. These soon hatch and the young larvae bore through the inner bark and the extreme outer wood of the tree trunk. The next 2 winters are passed in the larval stage, with pupation and the emergence of new adults occurring the second spring (Figure 10).

DIPTERA: CECIDOMYIIDAE

Needle Miner on Douglas-fir (Cecidomyia sp. Macquart). In October 1951 samples of Douglas-fir foliage containing dipterous larvae of the genus Cecidomyia within the needles were received from the Flathead National Forest, Montana. Concern over the appearance of the infested foliage was registered first by Christmas tree operators who noticed small, yellowed patches on the needles. Before a more positive identification as to the species can be made it will be necessary to rear adults from infested foliage. Little is known about this insect.

Since no entrance hole could be found on the surface of the needles, it is apparent that eggs were laid within the plant tissue. Upon hatching, the larvae seemed to develop very much in place as there was no movement or mining within the needle.

It is quite possible that the work of this insect has been confused

with that of another, namely, Adelges cooleyi Gill. In outward appearance the only evidence of the needle miner's presence was a short, pale yellowish area near the middle of the needle, similar to the yellowish blotch caused by feeding nymphs of the spruce gall aphid.

HYMENOPTERA: DIPRIONIDAE

Sawfly on Grand Fir (Neodiprion sp., near nanulus Schedl.). During July 1951 several colonies of sawfly larvae of the genus Neodiprion were observed feeding on grand fir foliage near Waha, Idaho (25 miles southeast of Lewiston). This insect was noticed first in 1950 on a few small (2"d.b.h., 15' tall) Douglas-fir trees that were also heavily infested by the spruce budworm. The same trees were attacked by the sawfly in 1951, but no other colonies have been observed elsewhere.

Groups of larvae consisting of up to 2 dozen individuals were clustered toward the outer tips of the branches, from which the old foliage was being stripped (Figure 12). The feeding gave a ragged appearance to the needles. Some were eaten completely off except for a short stub at the base, while on others only the fleshy portion was consumed, leaving the angular mid-rib which soon turned reddish brown (Figure 13).

Little damage to the trees has been caused thus far because of the low insect population level. However, at higher population densities, and especially in conjunction with the spruce budworm, considerable damage could result from the loss of old foliage along with the current growth destroyed by the budworm.

Figure 1. Effects upon alpine fir foliage of feeding by an undetermined large green aphid near Horton Creek, St. Joe National Forest, Idaho. The immature current needles on the branch tips are shown matted together with a sticky honeydew deposited by the aphids. (Johnson, 64'A 1458)

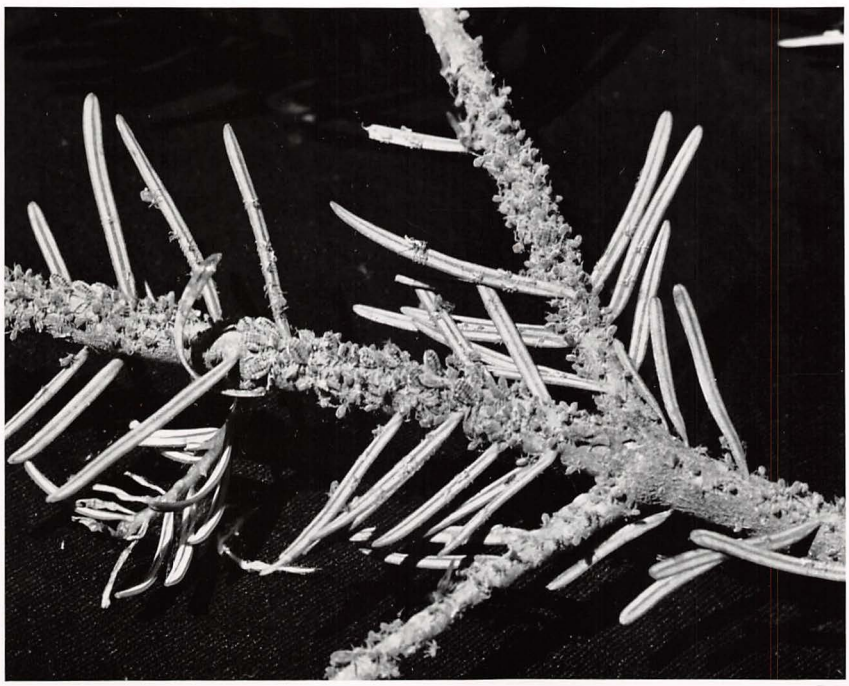

Figure 2. Aphid colony (Cinara sp.) feeding on a twig of grand fir near Wahn Lake, Nez Perce County, Idaho. (Johnson, 64'A 1461)

Figure 3. Sapwood surface of windfelled lodgepole pine tree scored by feeding galleries of new adults of Ips plastographus (Lec.). showing entrance holes of short hibernating tunnels constructed in the sapwood. (Johnson, Cd'A 1440)

Figure 4. Hibernating tunnels of Ips plastographus (Lec.) in the sapwood of windfelled lodgepole pine tree. Kootenai National Forest, Montana. Tunnels penetrate to a depth of 1/4 to 3/8 inch and are C-shaped. (Johnson Cd'A 1441)

Figure 5. Leader of Engelmann spruce tree killed by the Engelmann spruce weevil, Pissodes engelmanni Hopk. Pupal pits in the wood may be seen, as well as the struggle of the lateral twigs to replace the dead leader. Coeur d' Alene National Forest, Idaho. (Rust. Cd'A 547)

Figure 6. Bark removed on willow stem to show the work of the willow weevil, Cryptorhynchus lapathi (L.). Bunco Ranger Station, Coeur d'Alene National Forest, Idaho. (Rust. Cd'A 535)

Figure 7. Adult ten-lined June beetle, Polyphylla decemlineata (Say), feeding upon ponderosa pine foliage near Spokane, Washington. Only the mid-rib of the needles remains uneaten and this quickly dries out to assume a straw color and a grotesque winding shape. (Johnson, Cd'A 1396)

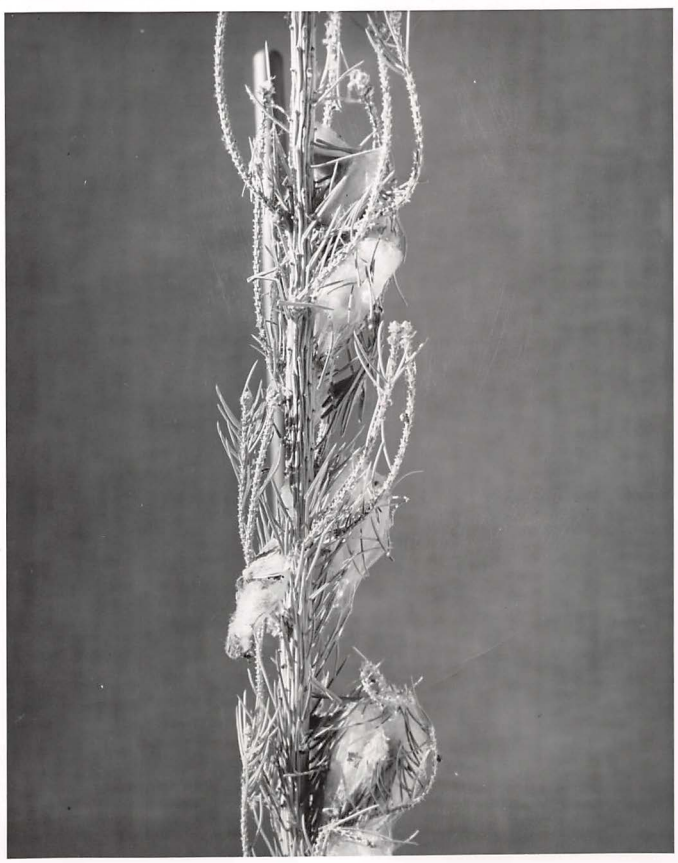

Figure 8. Cocoons of the forest tent caterpillar, Malacosoma disstria Hbn., on Engelmann spruce near Colville, Washington. The spruce was not fed upon, the loss of needles shown here being due to drying in transit. Normal hosts in the Colville infestation were willow, alder, and deciduous shrubs. (Johnson, Cd'A 1561)

Figure 9 (upper left). Pitch masses from successive years' attacks on the root crown of a lodgepole pine tree by Vespamima sequoiae (Hy. Edw.), the sequoia pitch moth, Glacier National Park, Montana. (Johnson, Cd'A 1429)

Figure 10 (Upper right). Newly-emerged female V. sequoiae moth. (Brunner, Cd'A 819)

Figure 11 (lower left). 20-year old lodgepole pine at Glacier National Park, showing open nature of infested stand and the absence of visual damage after 4 years of attacks by the moth. (Johnson Cd'A 1470)